Patent Claims

1. Apparatus for monitoring of a predetermined fill level and/or for determining the density or viscosity of a medium in a container, comprising an oscillatable unit (2), a driver/receiver unit (6) and an evaluation unit (8),
wherein the oscillatable unit (2) is placed at the height of the predetermined fill level, or wherein the oscillatable unit (2) is so placed that it reaches to a defined immersion depth into the medium,
wherein a feedback electronics (9) is provided, via which the driver/receiver unit (6) excites the oscillatable unit (2) to oscillate with a predetermined oscillation frequency,
wherein the evaluation unit (8) detects the reaching of the predetermined fill level on the basis of a frequency change and/or an amplitude change of the oscillation of the oscillatable unit (2), or wherein the evaluation unit (8) determines the density or the viscosity of the medium on the basis of a change of the oscillation of the oscillatable unit (2),
characterized in that,
in the oscillation circuit (7), formed of oscillatable unit (2) and feedback electronics (9), a microprocessor (8) is provided,
the microprocessor (8) corrects the phase of the feedback electronics (9) over a predetermined frequency bandwidth in such a manner that the sum of the phases of the feedback electronics (9) and the microprocessor (8) follows a predetermined function $f(\nu)$.

2. Apparatus as claimed in claim 1,
characterized in that
the frequency bandwidth preferably extends between the limits of 300 and 1500 Hz.

3. Apparatus as claimed in claim 1 or 2,

characterized in that
the sum of the phases of the feedback electronics (9) and the microprocessor (8) follow a predetermined function f(ν) = constant.

4. Apparatus as claimed in claim 3,
characterized in that
associated with the microprocessor (8) is a memory unit (10), in which at least one correction value is stored for the phase as a function of frequency.

5. Apparatus as claimed in claim 4,
characterized in that
the correction value for the phase as a function of frequency is available in the memory unit (10) in the form of a table or in the form of a computational algorithm.

6. Apparatus as claimed in claim 1,
characterized in that
an input/display unit (12) is provided, via which the function f(ν) can be prespecified.

7. Apparatus as claimed in claim 1,
characterized in that
the feedback electronics (9) provides the microprocessor with a periodic, preferably rectangular, input signal, which is used by the microprocessor (8) for determining a correction value for the phase.

8. Apparatus as claimed in claim 1 or 7,
characterized in that
the microprocessor (8) evaluates and further processes the signal delivered from the feedback electronics (9) in the time domain.

9. Apparatus as claimed in claim 7,
characterized in that
the microprocessor (8) determines in a first step, on the basis of the edges of the rectangular input signal (In), the frequency of the oscillation circuit (7),
the microprocessor (8) determines in a second step the phase correction value associated with the determined frequency, and
the microprocessor (8) issues an output signal with the corrected phase determined in the second step.

10. Apparatus as claimed in claim 1,
characterized in that
the microprocessor (8) determines the frequency over plural periods of the input signal (In) and performs a frequency weighting.

11. Apparatus as claimed in claim 1,
wherein an amplifier circuit (11) is provided, via which an output signal (Out) of the microprocessor (8) is fed to the driver unit (6) for the oscillatable unit (2).

12. Apparatus as claimed in claim 1,
characterized in that
the microprocessor (8) additionally assumes the tasks of the evaluation unit and determines the reaching of the predetermined fill level or determines the viscosity or the density of the medium being measured.

13. Apparatus as claimed in claim 7 or 11,
characterized in that
the feedback electronics (9) provides for the microprocessor (8) a signal which is amplitude-proportional to the input signal (In).

14. Apparatus as claimed in claim 1 or 4,
characterized in that
a further sensor, for instance a temperature sensor (13), is provided for measuring a process variable, the further sensor provides for the microprocessor information regarding the process variable, e.g. regarding the temperature, and
the microprocessor considers the influence of the process variable in the providing of a correction value for the phase.